U.S. Department of the Interior
Fish and Wildlife Service
Region 2
Environmental Contaminants Program

1998 Supplemental Sampling Report

Contaminant Survey Of Mescalero And Dexter National Fish Hatcheries In New Mexico - July 1995

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Introduction

In 1995, the U.S. Fish and Wildlife Service (Service) conducted a routine contaminant survey at both Dexter and Mescalero National Fish Hatcheries (NFH) (Simpson et al. 1998). Samples of water and sediment were collected from locations in and around these federal hatcheries. Two trout were collected at Mescalero NFH and two channel catfish were taken at the Dexter hatchery. Fish feed used at both hatchery locations was also analyzed, and two trout likely originating from the Mescalero NFH were collected from the Pueblo of Isleta fishing lakes. The results of the 1995 investigation indicated that arsenic and mercury were elevated in feed and fish fillets. Consequently, additional hatchery-raised fish were sampled in 1998 to evaluate current fillet contaminant concentrations of arsenic and mercury and are the subject of this supplemental report.

Service Contaminant Specialists who discovered the elevated concentrations of arsenic in feed and fish at Mescalero NFH hypothesized that the feed that the hatchery was using at the time of the 1995 investigation was the cause of the elevated concentrations of arsenic in fish fillets. Waste products from commercial fish processors are sometimes used as a source of protein in animal feeds. In general, fish from marine environments contain higher concentrations of arsenic than freshwater fish. Animal feed produced using protein sources obtained from sea life can contain more arsenic than if protein were obtained from other sources. The amount of arsenic in animal feeds can also vary greatly by lot, depending upon how much marine-life-based protein is used in any particular batch. Since the 1995 sampling, Mescalero NFH has switched to another brand of fish feed. If, as was initially hypothesized, feed was the source of the elevated tissue metal concentrations observed in the 1995 sampling, then a change in food source or lot could affect fillet metal concentrations.

Methods

Sampling techniques were similar to those used in the previous evaluation (Simpson et al. 1998) except that more fish were sampled (N=5), and fish were scaled prior to filleting, which is the technique recommended by the EPA (EPA 1995). In addition, both total and inorganic arsenic were analyzed, so an actual, rather than estimated, inorganic arsenic concentration could be used in risk calculations. Only total arsenic was measured in the previous evaluation.

Results

Concentrations of both mercury and arsenic in 1998 samples of fish fillets and fish feed were significantly lower than those measured in the 1995 sampling (Table 1 and Figure 1). Results of this current sampling, in which both total and inorganic arsenic were measured, indicate that on average 17% of the total arsenic was present in the inorganic form.

Table 1. Geometric mean (GMean), number of composite samples collected (N), and range for total arsenic, inorganic arsenic, and mercury concentrations (mg/kg wet

weight (ppm)) in feed and rainbow trout fillets sampled from the Mescalero National Fish Hatchery, New Mexico in 1998.

Matrix	*Analyte*	*N*	*GMean*	*Concentration Range*
Feed	Total As	2	1.070	1.01 - 1.13
Feed	Inorganic As	2	0.368	0.354 - 0.382
Feed	Total Hg	5	0.024	0.017 - 0.034
Fillet	Total As	5	0.167	0.090 - 0.220
Fillet	Inorganic As	5	0.026	< MDL[a] - 0.066
Fillet	Total Hg	5	0.028	0.024 - 0.034

a MDL = analytical Method Detection Limit

Discussion

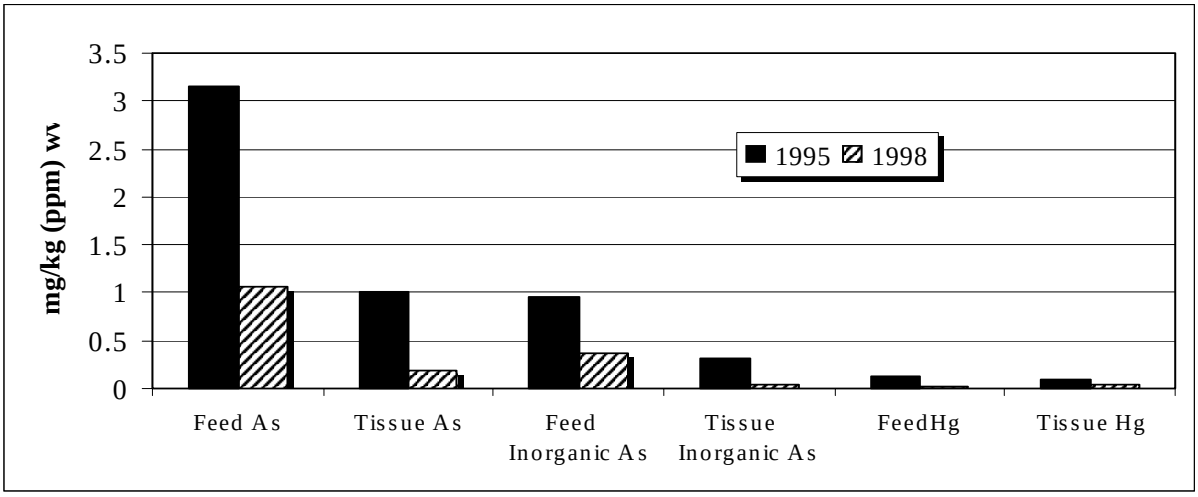
The concentrations of arsenic and mercury in the fish feed currently being used at Mescalero NFH are nearly 60 percent lower than those measured in the 1995 study. In the 1998 fillet samples, the total amount of arsenic measured was nearly 4.5 to 11 times lower than in the 1995 samples, and mercury was 3 times lower. Reduced feed arsenic and mercury content corresponded to reduced tissue metal concentrations (Figure 1). Two of the five 1998 samples of rainbow trout fillets from Mescalero NFH contained measurable concentrations of inorganic arsenic. Background fillet mercury concentrations have not been determined by the Service, so direct comparisons to 1998 fillet data are not possible. As a rough comparison, though, the geometric mean of the 1998 fillet mercury concentrations is six times lower than the 85th percentile mercury concentration of whole body fish sampled for the National Contaminant Biomonitoring Program (Schmitt and Brumbaugh 1990).

Conclusions

Arsenic (and likely mercury) concentrations in fish sampled in 1998 are less than or nearly equal to concentrations of fish collected from various sites in New Mexico, Utah, and Nevada, and/or fish collected for the NCBP program (Schmitt and Brumbaugh 1990). Results of this and the previous sampling have been supplied to the New Mexico Department of Public Health for further evaluation of potential human health risks. The Service, in cooperation with commercial fish feed manufacturers, is also considering procedures to evaluate and limit contaminant concentrations within feeds.

Figure 1. Concentrations of arsenic (As) and mercury (Hg) in feed and rainbow trout muscle fillets from Mescalero National Fish Hatchery, sampled in 1995 and 1998. Inorganic As concentrations for the 1995 data were calculated, assuming inorganic As is 30% of the total As concentration.

Literature Cited



*****Simpson, Z.R., R.M. Wilson, R.K. MacRae, and J.D. Lusk. 1998. Contaminants survey of Mescalero and Dexter National fish hatcheries in New Mexico- July 1995. U.S. Fish and Wildlife Service Environmental Contaminants Program Report Number 2F31 952006.1, June 1998. 47 pp.

Schmitt, C. J., and W. G. Brumbaugh. 1990. National Contaminant Biomonitoring Program: Concentrations of arsenic, cadmium, copper, lead, mercury, selenium, and zinc in U.S. freshwater fish, 1976-1984. Arch. of Environ. Contam. and Toxicol. 19:731-747.

*Note: This 1998 Supplemental Report will only be available as an attachment to the original report (Simpson et al. 1998).